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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/691,868	10/22/2003	Gregory R. Ruetsch	SUN-P8774-EKL	6769

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EXAMINER	
LUU, CUONG V	

ART UNIT	PAPER NUMBER
2128	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/691,868	RUETSCH, GREGORY R.	
	Examiner	Art Unit	
	Cuong V. Luu	2128	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 October 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-24* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,8-10,16-18 and 24* is/are rejected.

7)☒ Claim(s) *3-7,11-15 and 19-23* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *22 October 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claims 1-24 are pending. Claims 1-24 have been examined. Claims 3-7, 11-15, and 19-23 have been objected. Claims 1-2, 8-10, 16-18, and 24 have been rejected.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 9-16 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

1. As per claims 9-16, they are rejected under 35 U.S.C. 101 because it claims a medium that includes signals transmission medium with a carrier wave upon which the signals are modulated (pp. 7-8 paragraph 0031). These claims are drawn to non-statutory subject matter.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 8-9, 16-17, and 24 are rejected under 35 U.S.C. 102(e) as being anticipated by Kauffman (U.S. Pub. 2001/0032029 A1).

1. As per claim 1, Kauffman teaches a method for using interval techniques within a computer system to solve a multi-objective optimization problem, comprising:

receiving a representation of multiple objective functions ($f_1,\ldots,f_n$) at the computer system, wherein ($f_1,\ldots,f_n$) are scalar functions of a vector $x = (x_1,\ldots,x_n)$ (p. 19, paragraph 0257);

receiving a representation of a domain of interest for the multiple objective functions (p. 9 paragraph 0124. The teaching of performing simulation on a domain in this paragraph clearly suggests this limitation);

storing the representations in a memory within the computer system (p. 3 paragraph 0054. The teaching of performing the invention on a computer system indicates storing the representations in a memory within the computer system); and

performing an interval optimization process to compute guaranteed bounds on a Pareto front for the objective functions ($f_1,\ldots,f_n$), wherein for each point on the Pareto front, an improvement in one objective function cannot be made without adversely affecting at least one other objective function (p. 17 paragraph 0234);

wherein performing the interval optimization process involves applying a direct-comparison technique between subdomains of the domain of interest to eliminate subdomains that are certainly dominated by other sub-domains (p. 17 paragraph 0234. In this paragraph Kauffman teaches global and local Pareto Optimal. This teaching inherits direct-comparison technique between sub-domains of the domain of interest to eliminate sub-domains that are certainly dominated by other sub-domains as evidence by Fonseca,

Multiobjective Genetic Algorithms with Application to Control Engineering Problems, 9/1995, p. 39 definitions 3.1 and 3.2).

2. As per claim 8, Kauffman teaches a subdomain U certainly dominates a subdomain V if every point u ϵ U dominates every point v ϵ V; and

wherein a point a dominates a point v under minimization if,

$u_i \leq v_i$, i = 1,..., n and

$u_i \leq v_i$, for some i ϵ {1,..., n} (p. 17 paragraph 0234. In this paragraph Kauffman teaches global and local Pareto Optimal. This teaching inherits direct-comparison technique between sub-domains of the domain of interest to eliminate sub-domains that are certainly dominated by other sub-domains as evidence by Fonseca, Multiobjective Genetic Algorithms with Application to Control Engineering Problems, 9/1995, p. 39 definitions 3.1 and 3.2).

3. As per claim 9, these limitations have already been discussed in claim 1. They are, therefore, rejected for the same reasons.

4. As per claim 16 these limitations have already been discussed in claim 8. They are, therefore, rejected for the same reasons.

5. As per claim 17, these limitations have already been discussed in claim 1. They are, therefore, rejected for the same reasons.

6. As per claim 24, these limitations have already been discussed in claim 8. They are, therefore, rejected for the same reasons.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 2, 10, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kauffman (U.S. Pub. 2001/0032029 A1) as applied to claims 1, 9, and 17 above, and further in view of Fonseca (Multiobjective Genetic Algorithms with Application to Control Engineering Problems, 9/1995).

7. As per claim 2, Kaufman does not teach performing the interval optimization process involves applying a gradient technique to eliminate subdomains that do not contain a local Pareto optimum. Fonseca teaches using gradient-based optimization methods for finding optimum (p. 27 section 2.4 Genetic optimizer for control for engineering). This teaching suggests using gradient to find optimum for an interested region, being a domain or subdomain.

   It would have been obvious to one of ordinary skill in the art to combine the teachings of Kauffman and Fonseca for applying a gradient technique to eliminate subdomains that do not contain a local Pareto optimum. Fonseca's teachings would quickly have helped determine if a subdomain has a local Pareto optimum in non-linear functions.

8. As per claim 10, this limitation has already been discussed in claim 2. It is, therefore, rejected for the same reasons.

9. As per claim 18, this limitation has already been discussed in claim 2. It is, therefore, rejected for the same reasons.

Allowable Subject Matter

Claims 3-7, 11-15, and 19-23 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form to include all of the limitations of the base claim and any intervening claims and to overcome any applicable rejection(s) under 35 U.S.C. 101, set forth in this Office action. The following is a statement of reasons for the indication of allowable subject matter:

10. As per claim 3, the prior art does not teach a subdomain $[x]_i$ is eliminated by the gradient technique if an intersection of certainly negative gradient regions C_j for each objective function f_j is non-empty, $\cap C_j([x]_j) \neq 0$;

    wherein the certainly negative gradient region C_j for objective function f_j is the intersection of $N_j([x]_i)$ (the negative gradient region associated with the minimum angle Θ_j of the gradient off over the subdomain $[x]_i$) and $N_j([x]_i)$ (the negative gradient region associated with the maximum angle Θ_j of the gradient of f_j over the subdomain $[x]_i$).

11. As per claim 4, the prior art does not teach the method further comprises iteratively:

bisecting remaining subdomains that have not been eliminated by the gradient technique; and

applying the gradient technique to eliminate bisected subdomains that do not contain a local Pareto optimum.

12. As per claim 5, the prior art does not teach bisecting a subdomain involves bisecting the subdomain in the direction that has the largest width of partial derivatives of all objective functions ($f_1,\ldots,f_n$) over the subdomain.

13. As per claim 6, the prior art does not teach the direct-comparison technique is applied once for every n iterations of the gradient technique.

14. As per claim 7, the prior art does not teach the iterations continue until either a predetermined maximum number of iterations are performed, or the largest area of any subdomain is below a predetermined value.

15. As per claim 11, the prior art does not teach a subdomain $[x]_i$ is eliminated by the gradient technique if an intersection of certainly negative gradient regions C_j for each objective function f_j is non-empty, $\cap C_j ([x]_j) \neq 0$;

wherein the certainly negative gradient region C_j for objective function f_j is the intersection of $N_j ([x]_i)$ (the negative gradient region associated with the minimum angle BJ of the gradient off over the subdomain $[x]_i$) and Nj ($[x]_i$) (the negative gradient region associated with the maximum angle Θ_j of the gradient of f_j over the subdomain $[x]_i$).

16. As per claim 12, the prior art does not teach the method further comprises iteratively:

bisecting remaining subdomains that have not been eliminated by the gradient technique; and

applying the gradient technique to eliminate bisected subdomains that do not contain a local Pareto optimum.

17. As per claim 13, the prior art does not teachbisecting a subdomain involves bisecting the subdomain in the direction that has the largest width of partial derivatives of all objective functions (f_1, ..., f_n) over the subdomain.

18. As per claim 14, the prior art does not teach the direct-comparison technique is applied once for every n iterations of the gradient technique.

19. As per claim 15, the prior art does not teach the iterations continue until either a predetermined maximum number of iterations are performed, or the largest area of any subdomain is below a predetermined value.

20. As per claim 19, the prior art does not teach a subdomain $[x]_i$ is eliminated by the gradient technique if an intersection of certainly negative gradient regions C_j for each objective function f_j is non-empty, $\cap C_j ([x]_j) \neq 0$;

wherein the certainly negative gradient region C_j for objective function f_j is the intersection of $N_j ([x]_i)$ (the negative gradient region associated with the minimum angle Θ_j of the gradient off over the subdomain $[x]_i$) and $N_j ([x]_i)$ (the negative gradient region associated with the maximum angle Θ_j of the gradient of f_j over the subdomain $[x]_i$).

21. As per claim 20, the prior art does not teach the interval optimizer is configured to iteratively:

bisect remaining subdomains that have not been eliminated by the gradient technique; and

to apply the gradient technique to eliminate bisected subdomains that do not contain a local Pareto optimum.

22. As per claim 21, the prior art does not teach bisecting a subdomain involves bisecting the subdomain in the direction that has the largest width of partial 3 derivatives of all objective functions ($f_1,\ldots,f_n$) over the subdomain.

23. As per claim 22, the prior art does not teach the direct-comparison technique is applied once for every n iterations of the gradient technique.

24. As per claim 23, the prior art does not teach the iterations continue until either a predetermined maximum number of iterations are performed, or the largest area of any subdomain is below a predetermined value.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Cuong V. Luu whose telephone number is 571-272-8572. The examiner can normally be reached on Monday-Friday 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamini Shah, can be reached on 571-272-2279. The fax phone number for the

organization where this application or proceeding is assigned is 571-273-8300. An inquiry of a general nature or relating to the status of this application should be directed to the TC2100 Group receptionist: 571-272-2100.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

CVL